

Preliminary Labs21 Information

***Please note:** The preliminary information presented below is for discussion purposes only. This information will form the basis for discussions leading up to the first Labs21 meeting scheduled for September 8, 1999. Meeting participants will be helping EPA determine the direction, implementation, and future of the Labs21 Initiative.*

INTRODUCTION

The U.S. Environmental Protection Agency (EPA or the Agency) is interested in establishing a voluntary energy- and water-efficiency initiative for laboratory facilities called Labs21. Participants in the initiative will join EPA in establishing and meeting common goals and objectives. EPA is seeking interested parties to help design the initiative.

Significant improvements in the environmental and cost performance of the nation's public and private sector laboratories are possible. EPA has recent experience improving its own facilities' energy- and water-efficiency that it wishes to share with interested parties. EPA invites those interested to attend an initial planning meeting on September 8, 1999 to discuss the following:

- Improving energy- and water-efficiency in U.S. public and private laboratories.
- Lowering laboratory utility and operating costs.
- Reducing unnecessary emissions associated with the generation of electricity by improving energy efficiency and, possibly, by generating electricity from clean and renewable onsite energy sources.¹
- Anticipating industry changes affecting U.S. laboratories, including the effects of electric deregulation.
- Demonstrating that efficiency improvements can improve the quality of the work environment, including health and safety issues.

¹ Generating electricity onsite can enable a facility to obtain its electric power needs more efficiently by eliminating transmission losses and using waste heat to produce more electric power or to off-set thermal generation in the facility. Generating electricity from renewable sources can further increase the conversion efficiency and environmental preferability of onsite power generation.

- Applying a “whole buildings” energy and water systems strategy in the design, construction, and operation of U.S. laboratories.
- Establishing performance metrics and sharing bench marking data.

BACKGROUND

EPA recently implemented modifications at its Ann Arbor, Michigan, laboratory that will accomplish the following:

- Reduce annual electricity demand by 68 percent, from 2.5 MW to 0.8 MW.
- Reduce annual water consumption by 80 percent, from 31 million to 6 million gallons.
- Produce energy and water savings that will reduce the laboratory’s annual utility bill by 74 percent, from \$1.1 million to \$286,000.
- Recoup the cost of the equipment upgrades in 8 years.

In addition, the resulting decreases in energy and water demand will reduce the emissions associated with electricity generation, decrease the laboratory’s demand on limited natural resources, and dramatically improve the building’s environmental performance.

The Agency is currently implementing similar modifications to many of its other laboratories and is expecting similar results. Based on its success with its own facilities, EPA is proposing a national, voluntary initiative to encourage similar improvements throughout U.S. laboratories.

Why Focus On Laboratories?

There are four primary reasons to examine laboratory energy- and water-efficiency:

- Laboratories consume significant quantities of energy and water, so utility costs per square foot are higher than commercial buildings (a target of many efficiency efforts).

- Laboratories are often owner-occupied, which could facilitate the use of life-cycle cost strategies in energy- and water-efficient infrastructure investments.
- Laboratory construction is growing.
- Laboratories are high-tech buildings run by skilled facility technicians and engineers.

Laboratories Consume Significant Quantities of Energy and Water

Laboratories consume significantly greater energy per square foot than many other buildings. Assuming there are 40,000 U.S. laboratories, each with an average of 40,000 square feet, and each consuming 350,000 British thermal units per gross square foot per year (Btu/GSF/year), the annual energy consumption of U.S. laboratories is 560 **trillion** (5.6×10^{14}) Btu.² If only one-quarter of these laboratories could achieve energy-efficiency improvements of 60 percent (an efficiency gain achieved by EPA laboratories), then the United States could reduce its annual energy consumption by 84**trillion** Btu (8.4×10^{13}). This is the same as reducing carbon dioxide emissions by 19**million** tons annually, removing 1.25 **million** automobiles from our highways, or planting 56 **million** trees to off-set the carbon emissions associated with this energy consumption.

Laboratories Are Often Owner-Occupied

Laboratories are often owner-occupied. As a result, any cost savings associated with laboratory operations will have an immediate, positive benefit on company profits. In tenant-occupied buildings, however, owners pass energy- and water-consumption inefficiencies to the tenants. As a result, owners of tenant-occupied buildings are less likely to implement significant energy- and water-efficiency upgrades than owner-occupied facilities.

Similarly, EPA's proposed "whole buildings" approach is more appealing to owner-operated facilities. While laboratory owners and managers frequently seek opportunities to reduce utility costs, they typically only examine individual building components (e.g., lights; office equipment; or heating, ventilation, and air-conditioning equipment). Examining a building as an integrated unit creates

² EPA laboratories consume an average of 350,000 Btu/GSF/year. EPA assumes this figure reflects the industry average.

significantly greater opportunities for improving energy- and water-efficiency. EPA's experience suggests that a "whole buildings" approach works and can lead to significant economic and environmental benefits.

Laboratory Construction is Increasing

Laboratories are an increasingly important engine of economic growth. As a result, the construction of new laboratory facilities has risen steadily during the past few years. In 1996, new construction was up 4 percent from the previous year. In 1997, it was up 7½ percent from the 1995 baseline. In 1998, construction was up 15 percent and EPA expects it to be up another 20 percent in 1999 from the 1995 baseline.³

Unfortunately, many of these new facilities do not incorporate the latest energy- and water-efficiency and pollution prevention technologies in their design or operation. This presents a significant opportunity to improve the economic and environmental benefits of new laboratory buildings.

Laboratories Are High-Tech Buildings Run By Skilled Facility Technicians And Engineers

Laboratories, by their very nature, are high-tech buildings designed, built, and operated to facilitate cutting-edge testing and research. Due to the need to control carefully the air flow and environment within a laboratory, laboratory operation and maintenance personnel are some of the most highly trained facility managers in the country. As a result, their expertise can advance the understanding of the complex energy consumption dynamics that exist within all buildings.

Such an understanding would promote two important objectives:

- It could identify immediate and future cost saving opportunities for laboratory facilities.
- It could demonstrate to others the importance of an integrated energy management strategy and the effectiveness of advanced energy- and water-efficient technologies.

³ The growth rate in laboratory construction was provided by a major supplier of laboratory instruments.

The work conducted in U.S. laboratories is charting the future course of the nation and of the world. EPA is hoping the Labs21 Initiative will make laboratory buildings as innovative as the research conducted within them. The labs themselves should chart a new energy- and water-efficient future.

PROPOSAL

EPA anticipates the voluntary Labs21 Initiative eventually can expand beyond its initial emphasis on energy- and water-efficiency to incorporate the wider variety of pollution prevention opportunities that exist within laboratory facilities. The Agency recognizes, however, that the Initiative must begin with a strong focus to be successful. As a result, the Agency is proposing the following first-year objectives, which will be refined at the Labs21 meeting in September.

- Establish procedures laboratory owners and operators can use to evaluate the energy- and water-efficiency of their laboratories.
- Define the participation requirements for a Labs21 laboratory.
- Provide opportunities to exchange information on laboratory energy- and water-efficiency (e.g., conferences, newsletters, or Web sites).
- Identify, promote, and replicate demonstration projects to facilitate market acceptance of advanced energy- and water-efficient technologies.
- Establish award criteria for recognizing Labs21 participants.

As currently envisioned, the Labs21 Initiative will become a voluntary EPA program with two levels of participation as described below.

- **Members** — Members will agree to conduct an energy- and water-efficiency survey of their facilities consistent with the methodology developed by EPA and other participants at the September meeting. The methodology will emphasize a “whole buildings” approach in which members examine the laboratory as an integrated unit. It will examine the building’s overall energy- and water-efficiency rather than examining the efficiencies of individual building components. Based on the results of the energy- and water-efficiency survey, members will agree to review the potential cost savings of any proposed energy- and water-efficiency alternatives.

- **Champions** — EPA will recognize publicly those companies that implement the changes highlighted by the energy- and water-efficiency survey. The Agency will reserve special recognition for those companies that adopt renewable energy sources or achieve superior performance.

ROLE OF THE LABS21 CHAMPIONS

EPA and its federal partners will recognize Labs21 Champions publicly for their participation when the initiative is unveiled at the Labs21 Conference being planned for 2000.

The role of the Labs21 Champions will be to:

- Provide national leadership.
- Review and refine the initiative's goals to meet their energy- and water-efficiency needs.
- Implement projects consistent with the agreed Labs21 program strategy.
- Promote the initiative.
- Participate in or review demonstration projects.

FEDERAL ROLE

The Federal government partners will:

- Provide leadership.
- Develop a detailed "straw" proposal for Labs21 Members and Champions to review.
- Implement the Labs21 Initiative in federal laboratories.
- Promote the initiative.
- Assist with the energy- and water-efficiency surveys.
- Provide information and technical assistance.

- Conduct demonstration projects.
- Recognize participating companies wherever possible.
- Provide opportunities to exchange information, including conferences, newsletters, or Web sites.
- Compute the environmental improvements resulting from individual company participation in the initiative.

NEXT STEPS

If you are interested in becoming a Labs21 Champion or in learning more about the Labs21 Initiative, please take the following steps:

- Contact Romy Diaz, Assistant Administrator for the U.S. Environmental Protection Agency's Office of Administration and Resources Management, or Jessie Ulin, his Chief of Staff to express your interest. Both can be reached at 202 260-4600.
- Attend or designate a representative to attend the Labs21 Initiative kickoff on September 8, 1999, in Cambridge, Massachusetts as part of the Laboratories for the 21st Century conference.
- Consider participating in or attending the Laboratories for the 21st Century conference September 8 to 10, 1999 in Cambridge. (For additional information, including information on presenting a paper, please visit <www.epa.gov/labs21century>.)